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TRANSCRIPT:

KYLE HERRING: Good afternoon everybody, and welcome to the Johnson Space Center for today's briefing. Again, joining me is Shuttle Program Manager Ron Dittemore. He'll have as usual some opening remarks before we take questions.

We do have one hour for today's briefing, so I know we will not get to questions from everyone, so be patient with us, but Ron has quite a bit he wants to pass on leading up to what's been going on the last 24 hours, so I'll turn it over to him and then we'll take questions from the other NASA centers. Ron.

RON DITTEMORE: I wanted to begin today by reflecting some of the thoughts of yesterday. For us in this community and for those in the Shuttle Program, it was a wonderful day for us. It was a wonderful memorial. It was a very difficult day, but a fitting tribute to our friends. And we appreciate all those around the country that are supporting us and we appreciate those in the media for allowing us to have those moments alone in our own community.

And although the days still remain difficult, as I said previously each day is getting better. And the fact that we had the memorial and were able to gather together with the families, their loved ones, and be with them, support them, it began the healing process for us personally and as a community.

I understand that there are other memorials that are being planned and will take place this week and, again, those memorials will help us begin the healing process.

The work is going on. It's continuing to pick up speed and we are gathering more details. I'm going to talk to you a little bit about our timeline and some progress that we have made, but basically our timeline is stabilizing. And I have no new events to brief you with today.

What we have retrieved by way of the data and pouring over the events and any additional information has roughly been stable over the last 24 hours.

Previously we had talked to you about an additional 32 seconds. We have continued to attempt to retrieve information from that additional 32 seconds and have so far been relatively unsuccessful. We believe there is information within that timeframe; however, we have not been satisfied with the validity of the data, which means it's going to take us more time to pull out that information. So I'm hopeful that in the coming days we'll be able to understand if there's any new information contained within that packet of time, and if there is so then I will brief you on those facts.

I talked to you previously about the temperature rise and the loss of sensors on the left-hand wing. We are continuing to review that information and are backing out where we believe the heat source would need to be in order for us to have those indications present. So we're -- we are performing some reverse engineering, reverse analysis, to try to understand what would be the cause of such temperature rises in the wing.

On the flight control side, we are doing a very similar reverse engineering task and we're modeling the aerosurface positions, we're backing out the drag and the loads that would be required in order to cause the aerosurfaces to react and the jets to fire as I have indicated to you previously.

We are continuing to build a fault tree and we have many areas to investigate. We have not narrowed down to any one particular conclusion or any one favorite topic. We have many areas to investigate. The fault tree on the orbiter is tightly linked to the external tank fault tree and so those two areas are combining their efforts and talking closely with one another so that they have complementary analysis.

In addition, we are planning to test ET foam impact and also tile strength, just so we can have a better understanding of the capabilities of the tile and the foam softness, or depending on which side of the story you're on, how hard it might be. And today I brought with me a piece of foam, and I think we've made some foam available to you so that you can get an understanding of the composition of this material. It is very light-weight, which is logical, you would want it to be light-weight, because the more weight you put on the tank, the less upmass that you could launch into an orbit, so it's designed to be resilient and be an insulating material to keep the tank cold. It's designed to be on the tank also to keep the structure from getting too hot, and it's also designed to make sure that we reduce the aerodynamic loads and the flow stream around the tank.

Just a couple of features on this particular piece of tile. Tile comes in two different flavors, if you want to think about it that way. This particular tile has a -- has a crust on it or rind if

you want to think about it that way. Much of the tank is covered with this particular crust. There are other areas of the tank where we actually machine the top layer of the foam insulation making it much smoother and we do that for particular engineering reasons, but when it's smoother it's more aerodynamically effective and it's actually softer, and so as you get to handle these particular pieces of foam, try to get an understanding of its consistency, which is not very hard, in fact it's fragile, and it's easy to break and it's easy to break up into particles. And it's very lightweight. But I think this will help you understand why our engineers are coming to certain conclusions based on analysis and experience with this material.

We are continuing our photo analysis, trying to improve the resolution of the launch video. I do have a picture available that I was going to show you today from the launch timeframe. This particular picture has seventeen frames of information -- excuse me, on the left-hand side of the picture is a before-impact picture, on the right-hand side is an after-impact picture. Both these pictures were taken from a video, which unfortunately does not have high resolution. And as you can see, it's not very good for any detailed analysis, but it does show that as you look at it both before and after impact, there really is no gross large areas of damage. We are attempting to try to improve our resolution of the launch video to see if we can get any better information. But from a gross sense, we didn't see anything that would cause us a concern.

Also as we talk about photographic analysis and pictures. We are aware that we are getting a lot of help from the public from around the country, specifically in California, Arizona, New Mexico, West Texas. And we repeat our request made a day or two ago that if there are those that do have photographic information and imagery, we would be desirous to talk to you and receive that information, whether it be video or still photography. We believe that it may be of assistance to us. And if you do have this sort of information, we would encourage you to contact our NASA Emergency Operations Center with this information and we will provide you those details, the number that you can call that you can speak to someone and talk to us about what you have that may be of use to us.

From a site standpoint in the field, we are continuing to recover debris. It is beginning to be gathered more rapidly. We received the first truckload of debris to the staging area at Barksdale Air Force Base. Over the next several days we expect that to accelerate significantly and by the weekend we should have a large amount of debris gathered. We still have not received any what I call red tag pieces of debris that would be of special significance to us; we are still looking. And when we receive that debris, we will immediately send our engineering and technical folks to examine those articles.

We believe we'll stage this debris at Barksdale Air Force Base for some time to come and eventually our plan is to remove the debris to the Kennedy Space Center for its final destination.

I talked to you heavily before about the tile and I wanted to just add some more information to you so that everybody understands. Every time we fly a flight, we sustain

damage to the tile on the bottom of the vehicle. We average somewhere in the neighborhood of over a 100 tile impacts per flight. And of those 100, we average somewhere in the neighborhood of 25 or 35 impacts that would be greater than one inch. And all that is well within our experience base, and for all these 112 or 113 flights, we have never identified damage that would be a safety of flight concern.

Now, there certainly have been flights where we have had more damage than others and in each case we have attempted to identify the root cause, and then once we have identified it we have implemented corrective action.

We have had 11 flights with significant number of impacts greater than one inch, and so when we review our tile status post-landing, one of the perimeters that we look at are the number of impacts and those impacts that are greater than one inch. If we believe it's out of family, then that raises a white flag or a red flag and we start a process that starts analyzing if there's anything different in our process. And so tile is -- tile is an area where we are constantly measuring effectiveness of the tile and the number of impacts that we receive to determine whether we are doing anything different or if something has changed in our configuration.

We do have three reports related to tile damage and potential hazards. These reports were in 1990, 1994, and 1997, and these reports are available to you.

There was a question also about whether or not foam absorbs moisture. It does not. It's very resilient to any rain or moisture. And logically you would believe that to be true. If it weren't, it would be absorbing rain and moisture and would become much heavier. So it's designed to be very resistant to moisture. So it's essentially waterproof; it does not absorb moisture.

We talked about ice. Ice can form on the tank given the right environmental conditions. However, we have strict criteria on allowable ice. In some cases, ice is okay dependent on where it's located on the tank and the thickness of the ice. In other areas of the tank, ice is completely unacceptable, and the way we control that is to send an ice team out to the launch pad after we have loaded the propellant in the external tank and this ice team completely inspects the external tank exterior looking for ice, looking for sheets of ice, looking for thickness of ice. And in each case the ice team returns back to the launch complex and briefs the mission management team on the report. And if we believe the conditions of icing are unacceptable, then we delay or we scrub. So one of the main criteria for us to be go for launch is to make sure there is no unacceptable levels of ice.

A question was asked recently about the debris impact analysis that we have performed, that we performed during the mission. I mentioned to you that we assumed a piece of debris of the size of 20 inches by 16 by six with a weight of about 2.67 pounds, which we believe to be a very conservative weight. And when you pick up these pieces of tile, you'll understand what I mean. But we were trying to bound our analysis, so we were very conservative on the weight.

In addition to the weight, the air velocity at 82 seconds into the flight, the local air velocity is 750 feet per second. Even though the vehicle is traveling somewhere in the neighborhood of 2300 feet per second at this time, the local air velocity between the orbiter and the tank is around 750 feet per second. That's the transport mechanism.

In our analysis, we assume 1500 feet per second. So roughly in this case double the amount that we believe exists at the time of the debris falling off the tank. So to be conservative, again, we doubled the local air velocity, we were conservative on the weight of the material, and we were using a tool that we knew over predicted damage. And so it's difficult for us to believe as engineers, as management, and as a team, that this particular piece of foam debris shedding from the tank represented a safety of flight issue.

So we're looking somewhere else. Was there another event that escaped detection? As I mentioned before, we're trying to find the missing link. And as you focus your attention on the debris, we're focusing our attention on what we didn't see. We believe there's something else and that's why we're doing a fault tree analysis and that's why we're investigating every area.

Right now it just does not make sense to us that a piece of debris would be the root cause for the loss of Columbia and its crew. There's got to be another reason.

One last thought. Again, I would caution the people in the field to be careful about any handling of debris. I mentioned before about the toxicity, but it's come to my attention that there are other hazards that you need to know about. In our design, we make use of pyrotechnics which are basically small pieces of hardware that upon command explode in a controlled fashion to open certain parts of equipment, and it would not be easily detectable by eyesight whether or not you could determine you saw a pyrotechnic device. It would look very normal to you, but inside of it could be an explosion waiting to happen, and we don't want it to detonate, so be careful about handling material.

We also have batteries that have hazards associated with them. So it's more than just toxicity of material, it could be a very innocent looking material that has a pyrotechnic device inside of it, so be very cautious.

And with that, I'll take your questions.

KYLE HERRING: Okay. Randy, let's start with Mark Kerro right there, please. One question, please, everybody, so we can try to get through as many as we can in the 40 minutes I have.

NEWS MEDIA: Mark Kerro with the Houston Chronicle. I'd like to go to the left wheel well with this question. What was the highest temperature you saw there, and when did you see it, and is this a factor in some chain of events?

RON DITTEMORE: I do not have the magnitude of temperature, all I have is the Delta that I reported to you the other day, and I think I told you that we saw approximately 30 to

40 degree rise in five minutes. And that seems consistent with all the different temperature measurements that were not broken that were still giving us information. Thirty to 40 degree rise in five minutes.

Remember I told you that a 30 to 40 degree rise does not represent a catastrophic event in the wheel well, and even though we have pyrotechnic devices in the wheel well, 30 to 40 degree rise does not constitute cause for concern. So what we're trying to do is understand what would cause a 30 to 40 degree rise in the wheel well. Where does the heat source have to be within the wing or somewhere else to have a resultant 30 to 40 degree rise in the wheel well and a 60-degree rise on the sidewall of the orbiter above the wing?

And we have experts that are doing that type of work today mapping out where this instrumentation was located, trying to understand exactly when the events happened, and then doing the regression analysis to try to back out where the heat source had to be in order for the temperature rise to be reflected, and it's going to take us some time to do that, but that's what we're trying to do right now.

NEWS MEDIA: Bill Horowitz, CBS News. Since we only get one question, this is really a follow-up from the other day, so I'm curious, I'd like to have you explain a little better, discuss in a modeling sense if you've got drag on the left side and I'm assuming there's something causing turbulence under the wing of the left side whether it's an area of degraded tile or if something's going on there that's generating the heat.

A, I'm assuming from what you said about the rates with the aileron movement and the thrusters firing and the loss of being able to keep the nose pointed in the way you want it to go, but ultimately where you were going with that was this is getting sideways in the wind at some point and the vehicle's coming apart, I'm assuming that's what you were implying. I'd like some clarification on that. In other words, does the wing have to fail itself to get you in that situation or can you have a pretty much intact wing but the drag gets so high that you get sideways enough that aerodynamically the vehicle's going to come apart.

And finally, I was curious, your the 32 seconds -- I'm unclear on the timing. If you lost the comm. at right at 9:00 a.m. Eastern Time, is it 32 seconds beyond that it was still sporadically transmitting data so even if it was breaking up, the fuel cells are generating power still and some antennas are still beaming down data as it's coming apart. If you could just talk about that.

RON DITTEMORE: Those 32 seconds represent a period of time following loss of signal and that loss of signal as we have defined it is when the flight control team lost the signal available to them to monitor data. And the reason that occurs is that we have software programs that analyze the validity of the data as it comes into the building and when it detects an error rate in the data greater than some amount, it cuts off all data. But we can go back into the software and override this error rate criteria and then we can pull out the data and look at it to see if it's valid or not, and that's the time-consuming process.

And we have a number of perimeters there that might be useful to us that are after the time where we had a cut off. So it might provide some details as to what happened to the vehicle when we lost all insight. And we're taking painstaking approach to try to pull out every nugget there and that's going to take us some time. And we thought it was going to be easier than what it has been. It's the validity of the data that's -- that we're not satisfied with and we don't want to make a wrong assumption and then make a judgment based on erroneous data. So we're being very careful with that.

As far as the airstream goes, the drag was certainly increasing. The aerosurfaces and the reaction indicate something on the left wing. What, we don't know. Whether it was a rough surface, missing tile, something wrong with the left wing, we don't know. But there's every clue, every indication with aerosurfaces and the RCS jets firing on the right-hand side that says yes, the vehicle, the flight control system is trying to overcome a disturbance. And it is doing well at maintaining control, but it's losing the battle.

If you look at the rates of the vehicle, more and more flight control muscle is being added to keep the vehicle pointed straight ahead and eventually that flight control muscle is going to run out; you only have so much. And when it does, you eventually will lose control. And we see from the rates prior to loss of signal that we were beginning to lose the battle; the drag was becoming more overpowering from a rate standpoint than our aerosurface and our reaction control thruster ability was able to control.

Perhaps this 32 seconds will help us understand some sequence of events in the aerosurfaces and the reaction control system that will help us quantify that, but today that's all I have.

KYLE HERRING: Dan?

NEWS MEDIA: Dan Balina from NBC News. Mr. Dittemore, given your search for a missing link, what level of attention are you giving to the possibility that some foreign object, either a bit of space debris, some sort of meteorite or any other kind of foreign object may have struck the Shuttle? Any conclusions or observations on that so far? And would you care to reflect on such events that have happened in other flights?

RON DITTEMORE: Well, we have experience with space debris. We have had impacts. I think we've mentioned to you before that we have had occasional impacts on our windows. We've had impacts that have occurred in our radiators. So there are small pieces of debris in space, remote that they will hit the orbiter, but we've seen it happen.

Is it a likelihood in this case? I'm not sure. It's certainly possible. How likely, I don't know. And it would be very difficult for us to decipher if that did happen, unless we are extremely fortunate in finding a piece of debris that would point us in that direction. That would be the only way for us to tell.

And so the evidence that we find on the ground and evaluating it and testing it will help us point in the right direction, whether it was something that happened after launch and

during the on orbit phase, whether it was something that happened during the entry phase, or was it something that happened during ascent and we didn't see it. Those are all possibilities. I know a lot of you have focused on the ET shedding of the debris, but we have not. We're looking at all these other areas because they are also possible and we just don't have any evidence to point us in one direction or another. And we are struggling to find that indicator, that pointer, to help us identify that missing link.

NEWS MEDIA: Yeah, Ron, Donald Forbes, WKMG out of Orlando. We're told or we know that you're doing water testing off at the Cape there as far as currents go. Is that because you're looking for debris out there in the form of foam or could a tile have shaken loose on liftoff out there? Is it floating off the coast of Florida somewhere right now?

RON DITTEMORE: It's a shot in the dark. We're trying to cover all bases. Just as we're searching out in West Texas and New Mexico, Arizona, California, we asked ourselves is it worthwhile for us to understand maybe some debris dropped off during launch that we did not see. And if it did, perhaps it washed up on a beach someplace, and so we're studying the currents to try to determine if it's possible that any debris would be located on a beach, and if it were, about what location. And I'm not very hopeful that we'll find anything, it's been some time, but we're asking ourselves that question just to be very thorough and we'll determine whether or not we think that's going to be fruitful.

KYLE HERRING: Go ahead, Kelly.

NEWS MEDIA: Kelly Young at Florida Today. Understanding you didn't have an RMS, did you have all the other spacewalk gear on board like tethers, safers, things of that sort if you decided for some reason that you needed to go outside?

RON DITTEMORE: We certainly had the spacewalk equipment. We had the space suits, because every time we go into space we carry those in case we have some type of an emergency that would require us to go outside and get the payload bay doors latched properly or something like that. I don't recall if we had the safer. The safer is a device that a spacewalker can use and gives him a little bit more mobility. I don't recall if we had it on this flight or not. Let me go check that.

Did I answer the question?

NEWS MEDIA: Tethers.

RON DITTEMORE: Tethers. Certainly we had all the tethers that would allow a crewman to go outside and be safe within the confines of the payload bay. We don't have any tethers where you can jump over the side and go underneath the wing.

KYLE HERRING: Marsha.

NEWS MEDIA: Marsha Dunn, Associated Press. As you look at all the something-else clues that might have gone wrong, have you given much or any thought to whether any

rainwater could have somehow penetrated defective foam and created moisture that would have turned into ice? And what kind of analysis are you doing to see if indeed that 2.5 pound chunk was really heavier and more volatile?

RON DITTEMORE: Again, it's like reverse engineering. If there was damage in the wing and we don't believe it to be the size of foam that was shed by the tank, well, then, what size and what mass, and mostly it's what mass, must it have been to cause damage to the wing? If that is the scenario. And remember, that's not the only scenario.

But in that one case, if that were the scenario, what must have been the mass? If it's not this one pound or 1.5 pound piece of debris, what must it be to penetrate the tile or create so much damage that it would provide some type of thermal path for a plasma to get into the wing. That's the type of testing that we're going to do when I talk about foam testing into the tile and the tile strength. We're trying to reverse engineer to try to understand what could or what size of object would it have to be by weight to create sufficient damage to end up with the loss of the vehicle. That's going to be part of our test program.

But we don't believe it's this chunk of tile or chunk of foam; we don't believe it's this foam; it's got to be something else that we don't know about yet.

KYLE HERRING: Okay.

RON DITTEMORE: I don't think it's ice. I don't think there is an imbedded ice question here. I don't think this came off as a chunk of foam solidified with ice.

If you look at the picture of the video, when it hits the wing, this piece of foam disintegrates, and remember I mentioned the other day, the lightness of the color and it just disintegrates into this dust and so I believe this is what we're seeing. And although we're going to look, we did not have icing conditions that day. We verified from the ice team there was no ice in those locations. And those are critical locations for us. So we verified we didn't have the ice. It's impervious to water, so it's something else. It's something else.

KYLE HERRING: Okay. I've got time for two more questions right here and then right here.

NEWS MEDIA: Miles Moffitt, Denver Post. You mentioned that you had taken corrective action in the past after these debris collisions. Did any of those corrective actions include revising the methods for applying foam manually by hand as opposed to what is done in Louisiana in terms of the automated application?

RON DITTEMORE: A couple of different ways to address that. All of these cases did not involve debris from the external tank. In one case it involved, I believe, insulation shedding debris from the nose cap of the solid rocket motor, the booster, and we corrected that condition by changing the installation -- the insulation material.

In other instances I talked to you about popcorning, that popcorning phenomena, and it turned out the root cause there was the makeup of the foam itself. We had changed the foam mixture because of environmental considerations and it turned out that as we went into space, as we got higher in altitude, we were off guessing in such a way that that tile was exploding out or little popcorning out of material. And we fixed that by machining the tile differently. I mean, you put it on the same way, but you physically go in there and shave it, so you contour it appropriately, and then we actually went in and vented the tile layers by basically taking a tool with – an easy way to describe it is if you had a brush that had a hundred needles on it and you just shoved it into the foam and it penetrates some nominal area and then pulled it out, you've basically provided some venting relief for the surface. And instead of outgassing and developing pressure underneath the surface to the point where it would just burst out, the holes provided an escape path for the pressure keeping the intact or keeping the surface of the foam intact, and that's how we solved that problem. And we've not had that problem since.

And that's why I say, we investigated each and every one of those circumstances and identified the root cause. We may have not have got it right on the very first case, but we eventually learned and got it right. So we eliminated that problem.

KYLE HERRING: Okay. Let's go to Miles right here, please.

NEWS MEDIA: Miles (inaudible) CNN for Ron. Question about the reverse engineering of where precisely that all this heating began. If you could just give us a sense of how they can do that. And also it seems to me that there can't be too many possibilities given the nature of the heating, the outside of the fuselage, the wheel well, the way it all comes together. Can you give us the likely place where that heating event began?

RON DITTEMORE: I don't have the likely place yet, but we will. I've looked at pictures of the wing; I've looked at where these temperature sensors are located in the wheel well, at the elevon, both the left inboard, left outboard. There are skin temperatures, I've looked at those, and so we also know where the wire routing was located within the wing. And so when you do the reverse engineering, it could be a couple of different locations depending on the sequence of which these temperature sensors were either lost or the heating took place.

If you looked at the construction of the wing itself, it's not all hallow inside, it's a girder structure, it's got a lot of structure in there to make it very sturdy and solid, and if there was some type of heat path, it would have to work its way around some of the structure and so we have to be careful about how the structure itself may play into the heating of the wheel well or even the side wall of the vehicle.

I don't think it's a complex problem, but we do have some real sharp technical experts from around the country that are helping us work on that puzzle.

KYLE HERRING: Okay. Let's go to the Kennedy Space Center for about five minutes worth of questions.

NEWS MEDIA: Ron (inaudible) for the New York Times. What indications do you have, if any, that the pyros, the pyro charges in the left wheel well did not explode maybe due to overheating opening up the landing gear door and letting the hot plasma into the ship, which I assume would have cut off all the telemetry and communication as it did happen.

RON DITTEMORE: Well, the only information I have is that the wheel well increased in its heating 30 to 40 degrees and that 30 to 40 degree increase in five minutes is not sufficient to reach any temperature that would detonate the pyrotechnics. And at the end of that five minutes, we lost the signal and so we saw some rate of increase in temperature and that increase is not sufficient to detonate the pyros based on our understanding today.

So I don't think there is a possibility that the pyrotechnics detonated because of some heat source. We have indications in the wheel well that indicate to us what the environment was. It was not a significant increase. Thirty to 40 degrees is not significant when you talk about the detonation levels of the pyrotechnics.

I haven't looked at the fault tree analysis yet that's being performed. And remember what a fault tree analysis is. You start at the top by saying you lost the vehicle and then underneath that are many different reasons that might be possible. You lost the left wing and then underneath that all the reasons you might lose the left wing. And maybe down within that fault tree analysis is a box that says main landing gear pyrotechnic. So I can't tell whether that's true or not; I haven't seen that. If it is, we'll come back to you and I'll change my story. I'm just not aware of that today.

And it seems illogical that the pyrotechnics would be a root cause when I do have indications of a temperature rise that would be insufficient to detonate the pyrotechnics.

NEWS MEDIA: Hi, this is Chris Kridler from Florida Today. I know you've said the crew was told about the foam debris and General Kostelnik said this morning that the crew was aware of discussions of engineers on the ground and their concerns. I'm just trying to get a handle on how specific was the information given to the crew? Were they told specifically about the potential for the loss of a number of tiles, for instance?

RON DITTEMORE: I did not hear first-hand what was relayed to the crew. Our policy is that we tell the crew everything. We don't hold anything back from the commander on the scene; he gets everything that we know. And we also provide the commander and the crew the rationale so they have a good understanding of why we believe things are okay. So I believe that the commander was satisfied with the information that he received.

We also give him the opportunity to talk to the ground. If he doesn't understand what we told him or if he feels he needs more information, he's got a number of different avenues to request that information and we would have been glad to provide anything that they desired. In this case, I'm not aware of anything other than we alerted them to the fact that we did have a debris impact, we alerted him to the fact that we had done the analysis. Everybody was involved in the analysis that needed to be. He knew that his people, his

astronaut friends, were involved in the analysis, he knew that program management was involved, and he had the confidence in us to do the right thing.

So once you as a commander, if you put yourself in his shoes, understood those ingredients, you would feel comfortable and you would get on with the work at hand, because he was a busy camper; they had a lot to do. And I think it would be natural for him to ask questions if he felt uncomfortable, but I think he was perfectly satisfied with the explanation.

NEWS MEDIA: This is Seth Bornstein from Night Reader. I just want to make sure I understand this. Now that you're moving away, at least in your mind, from the foam debris, is that because your secondary re-analysis that you talked about. And along the same lines can you tell me how many times you met either in conference call or in actual physical meetings between January 18 when you first discussed the issue and January 28, can you go through, like, which days you did it? Was it every day two or three times a day? How many total meetings?

RON DITTEMORE: I don't have the number of total meetings, and I believe the last time that I talked to you I gave you a timeline of events on which days the teams met and then reviewed analysis. And typically they would meet several times during the day. They would meet as required. If it meant they had to work 24 hours, they'd work 24 hours around the clock.

So I don't really have that information on how many times they got together and where they met.

NEWS MEDIA: Ron, this is Phil Chin with Earth News. I wanted to verify Bill Horwitz's question. The 15 days 22 hours 20 minutes and 22 seconds that (inaudible) mentioned, I assume that's when we heard the last from Rick Husband when he replied "Also Houston, ah," and got cut off. And are you talking about that the 32 seconds additional data is beyond that point when the voice got cut off from the Shuttle? Or if not, then what are those times?

RON DITTEMORE: Well, I can't confirm the numbers that you just mentioned because I don't have those memorized. We can certainly check against those numbers versus where we think the loss of signal occurred and the 32 seconds, but it's a fact that the 32 second period is after the loss of signal.

KYLE HERRING: Okay. I think that's all at KSC. We're going to Headquarters in Washington now, please.

NEWS MEDIA: Hello, Wilson Disart here with Government Computer News. Ron, could you please describe in some detail the computer systems that you have deployed to analyze the data related to the Columbia tragedy, including the data bases, the bottles, the tools, the geographic information systems being used to analyze the location of the debris? Thank you.

RON DITTEMORE: That's a very tough question for me to answer. I'm an engineer who needs help turning on my computer and I use word processing and I need help from folks in our office to make sure I use it properly.

I'm not fully aware of the computer systems that we are using. I could work on that and get back to you and on the specific tools. So why don't -- why don't you let me work on that in a day or so, and if you're still interested in that question, ask that back to me and hopefully I'll have a response.

NEWS MEDIA: Christie Watson, USA Today. I've got a pretty technical question for you, Mr. Dittemore. Did you at any time when you were analyzing the impact of the debris do a model of the early transition or asymmetrical boundary layer transition with different damage scenarios to the left wing? And if not, why not?

RON DITTEMORE: I'm not sure I understood exactly what you asked me there. Try it one more time.

NEWS MEDIA: When you were analyzing the impact of the debris on the left wing, did you ever model the boundary layer transition or early transition boundary layer transition effects on the left wing?

RON DITTEMORE: Okay. I'm with you. I don't believe we did. We'll double-check that. The reason I say I don't think we did is because we believed that the -- any damage to the underside of the wing caused by any debris was not going to be consequential to us and it would not affect flying qualities. And what that means is it would not change our boundary layer conditions, it would not trip our flow over the wing in such a way that our expectations of how the airflow goes around the wing would be changed. So we believe that for all flying conditions it was nominal and that we would certainly have the expectations that that is the case.

And if you look at the flying qualities of the vehicle up until the last minute or so, it was -- it was perfect, and so only after we sensed the increase in drag and analyze it do we see something there that was unusual. But up until that point the flying qualities were just as we would have expected.

NEWS MEDIA: This is Kathleen Coke with CNN. We learned after this morning's briefing that NASA has seen an anomaly in Columbia's contrail as it was coming in over California. Can you describe to us this anomaly and any theories that NASA has right now as to what might have caused it?

RON DITTEMORE: I have personally not seen any pictures, photography or video from the trajectory, whether it's from California all the way to west Texas. Our imagery teams and photographic analysis teams are collecting that information. And once we collect it all, I think it's important for us to get a lot of that data pulled together and look at it in time sequence and make sure we lay on top of each other the video, the events that I

described to you as far as instrumentation and the flying control or the handling qualities that I mentioned as far as the increasing drag.

And when we lay all those pieces of information on top of each other, that's going to be informative to us. We hope that there are some items that kind of poke out that would help us determine that there are areas that we would like to have further inspection or penetration in our analysis.

NEWS MEDIA: Yes, Ricardo Alonzo Saldavar with the LA Times. On Monday you mentioned that since the accident you have become aware of some reservations that were expressed that you were not aware of prior to the accident. Can you tell us what you've done to go back and examine those and give us a little bit more detailed at what level these reservations were expressed?

RON DITTEMORE: Well, all I can say is I'm aware that there have been some reservations expressed and we have identified what those are and put them in the proper context. I've gone back and tried to understand from those that were participating in the engineering meetings what it meant to have reservations and asked the question were these reservations concerned with the analysis? Were these reservations related to the conclusion? Were these reservations related to the process? And the answer I've received is that the reservations at the time were not related to the conclusion, they related more to making sure that the proper analysis was absolutely completed and these reservations did not manifest themselves after the analysis was complete and the decision was made. These reservations were part of the process when engineers get together and work together to make sure we have the right checks and balances that ask each other are we doing the right things and are we doing them in the right order.

And so I would expect some of these reservations to be absolutely normal, because when we get together and work on a particular project, challenging and complex project, not everybody agrees on the same path to follow, not everybody agrees to the interpretation of certain data, and so there's a good healthy tension between engineering disciplines and that's what we describe as our check and balance.

This good healthy tension challenges assumptions. It challenges interpretation of data. And this is what was going on during the process of analyzing the debris impact to the wing. So the question -- and I would consider that to be normal. In fact, if it's not there I would be concerned, because I want the healthy tension, I want the discussion. I don't want complete agreement in the process; I want people to be challenging, because that brings out the real issues.

But in the end, when asked was there anybody concerned about the conclusion, are we satisfied that we have the right conclusion based on the analysis, the answer is yes, we're satisfied.

So reservations were more along the process and not after the fact when a decision was made. And so I'm penetrating those types of reports. And, again, as we go through this

investigation, we'll be cataloging those and make sure that we haven't overlooked any of those reports, nor have we sidestepped them. We want to make sure we understand each and every one.

KYLE HERRING: Okay. That's all in Washington. Let's go to the Marshall Space Flight Center for one question, please.

NEWS MEDIA: Ron, Shelby Spires with the Huntsville Times. Given the number of reports that are floating around and you referenced three of them earlier and I think there's some about the ET manufacturing process in the foam, can you give me an idea of how many of these come out from your engineering teams a year and how many come across your desk? And what's the process into saying or instigating what these reports suggest should be done?

RON DITTEMORE: Typically these reports are an end product to a long investigation that involves a lot of analysis, good healthy debate, challenges of assumptions, and then typically a report would offer recommendations, and what I generally look at in a report is the recommendations that were offered and whether or not they are applicable to our particular situation. And if judged to be applicable, then I'm interested in implementing the recommendations and following through to make sure they're complete.

And so when I review a report, my particular responsibility is to make sure the appropriate actions are assigned, implementation -- appropriate implementation is completed, and that we're all satisfied with the resolution, and that's how I use these reports.

KYLE HERRING: Okay. I believe we have one question at the Command Center in Lufkin, Texas. Go ahead.

NEWS MEDIA: This is Joe Grundio with the Associated Press. Can you specifically describe any debris that's being red tagged for immediate analysis? And are you relying solely on ground searching to find debris or are you using specific remote-sensing capabilities?

RON DITTEMORE: We're utilizing all available tools to search for debris. We're group-forcing it on the ground by looking for it manually on foot, four-wheel vehicles, on horseback, whatever it takes to look for debris. We're using sensors and aircraft or helicopters to search for debris. And at this point we have not identified any what I call red-tagged debris that would -- that is on our specific list of highly important pieces of debris.

We have identified a list of items that are more important than others, things like the left wing, pieces of the left wing, tile, recorders, whether it be voice or data recorders. Those are the types of things that are on this list that when we find those types of items, we want to red tag those and get our engineering teams out to look at those right away.

KYLE HERRING: Okay. We're back here. We have time for just a few more questions. Let's start right here with Bob.

NEWS MEDIA: Bob Hager from NBC. The father of the Israeli astronaut in two interviews that I know of so far have said that NASA officials have told him that the astronauts would have had between 60 seconds and 90 seconds from the time that they realized something was drastically wrong to the virtual do you believe they were told that? Or what light can you shed on it?

RON DITTEMORE: I don't know anything about that and I can't even comment on it. That's the first time I've heard that.

KYLE HERRING: Okay. Cherise.

NEWS MEDIA: Cherise Donte with the Palm Beach Post. Mr. Dittemore, has there been any discussion ever in the program to try to put the RMS on every flight? If nothing else, just a diagnostic tool for looking at the wings, things like that?

RON DITTEMORE: Typically we fly the Remote manipulator system every time. In some cases we take it off because it -- although it provides the capability, it does impact our performance, so it weighs a number of pounds. And if we take it off, it's that much more science that we can put on the flight and conduct in space.

So if you believe the risk to any tile damage -- if you believe the risk of tile damage to be low, then you would opt to load as much science on the mission as possible, because after all, we're taking the risk to go into space for a valid reason and that is to conduct research and science, and we balance the tools at our disposal with the probability and the risk. And if we believe the probability is low, the risk to be low, then we'll maximize the science, because that truly is the return on the investment. It's the science, it's the exploration, it's the research, and so we don't want to overburden our flights with every article of protection when the probability of occurrence is extremely low. That's the trades that we make. And in some cases that's why we don't fly the RMS, because the probability of having a significant tile event that causes a concern is very low.

KYLE HERRING: Okay. I've got time for three more questions and then I'm going to take this gentleman, this young lady right here, and that gentleman back there. Go ahead.

NEWS MEDIA: Ron, John Kelly with Florida Today. I'm wondering about temperature readings or indicators of any kind that can be traced back to the ET umbilical door on the left side, which is a little more aft than the area we've been talking about, but which some of your initial debris analysis says that's where that pulverized cloud of foam dust was is in that general area.

And the reason I ask is what would a direct debris impact there mean at that spot and would that be more significant in terms of tile loss? Are those tiles more exposed because

you're hitting edges of tiles and because you've got an open area of orbit there, the one area where you don't have -- where you have an open spot?

RON DITTEMORE: Okay. Just to get us all oriented here, I don't believe the analysis from the debris predicted that it would impact in the ET umbilical area. I don't think that's the case. I think it was much different than that, more outboard.

True, during ascent while you have the external tank connected to the orbiter, you have a hard-mated interface between the external tank umbilical on the external tank side and then its corresponding umbilical on the orbiter side. Once you separate from the external tank, then we have umbilical doors that are latched open during ascent and launch and after ET separation, they close and latch and so you have a good solid door closure confirmed to be latched and the bottom of the vehicle, the bottom of these doors are all surfaced with heat-resistant tiles, and so those doors were latched, the bottom of the vehicle was a good surface with tile, and I don't believe the ET umbilical is a source -- is going to be a source of information. In fact, the instrumentation that we have looks normal except for those pieces of information that I've talked to you about. Everything else looks okay.

KYLE HERRING: Okay. Go ahead.

NEWS MEDIA: Judy Graham of the Chicago Tribune. You mentioned that on average a hundred tiles are damaged in any given flight. Are those tiles under the wing? Are they all over the aircraft? And do you know how many under the wing are damaged on average during the flight?

RON DITTEMORE: Just a little bit of a correction there. It's a hundred impact points, not separate tile. It could be a multiple on a single tile. A hundred different impact points. And it can come from a variety of reasons. When you land on a runway, and you've watched the orbiter come in and land and you know it kind of picks up some dust and debris, that can be picked up and impact the tile, and so there's damages, just natural damage that can occur just from debris on the runway, dust, particles coming up underneath and damaging the tile.

And then of course you could get some on launch. You get some from maybe some tile shedding -- I'm sorry, some foam shedding, but again, these are very, very minor in nature representing a turn-around processing concern, just because it takes more time and you got to repair them, but not ever a safety of flight concern.

KYLE HERRING: Okay. Final question right back here.

NEWS MEDIA: Dr. Dittemore, Shaker (inaudible) from the Washington Post. A two-part question. One, have you learned anything from military photographs that were apparently taken of the Shuttle in its final moments? And second, there have been reports, perhaps anecdotal, that a tile holder, a metal tile holder was found today in California, and I'm

wondering whether discovery of debris in California pushes back your timeline of what was actually wrong with the Shuttle.

You had said that at 8:53 Central Time you had sensors in the wing that basically went kaput, but does a discovery of debris and perhaps even a tile holder in California perhaps indicate that the problems started much earlier, perhaps even while the Shuttle was over the Pacific?

RON DITTEMORE: Well, from the photography point of view, we're seeking information from all sources, public and government, including Department of Defense resources. We're searching all avenues to see if there is some information that can come to the table to help us understand the events.

And if we found debris in California, Arizona, New Mexico, along the ground path, certainly that would be a significant finding to us. And the particular debris would also point us in a direction and so that would be very, very significant, and that's why we've invested a lot of energy in following up on these reports.

We are also trying to calculate, as I mentioned once before, if debris were to shed anywhere from California to the West Texas area at such a high altitude and speed, we're calculating where that debris -- what debris footprint would be involved in order for us to go search that area. And you can imagine, these are large footprints and it's going to take us some time. And that's where the public is so necessary for us. If they come across this debris because they're just out and they're being observant because they're helping us and they identify something and call into our operation center, that would be very beneficial to us.

You did mention the time. And it was 7:53 a.m. Central Time, Central Standard Time, not 8:53.

KYLE HERRING: Okay. That's all the time we have today.

A couple of final programming notes for folks. Again, some of the words that Ron mentioned, we'll put up a slate for you for that phone number once again. The e-mail address that we would like folks out there, especially folks that may be on the West Coast in the California, Arizona, New Mexico area that Ron mentioned, that phone number there on the screen (281) 483-3388. That is the Emergency Operations Center here at the Johnson Space Center. The e-mail address columbiaimages@nasa.gov and, again, the physical address for video or larger files or photos: Emergency Operations Center, Mail Code JA17, Johnson Space Center, Houston, Texas.

There is a memorial service tomorrow that will air on NASA Television at 1:00 Eastern Time. That will be from the Washington National Cathedral in Washington D.C. And, again, our next briefing from here will be tomorrow, once again at 3:30 Ron will be back and we appreciate you all’s patience. Thank you very much.